

THE FRANKLIN INSTITUTE OF THE STATE OF PENNSYLVANIA

For the Promotion of the Mechanic Arts

Committee on Science and
the Arts Case No. 2878.

Report of Sub-Committee, dated December 7, 1927, investigating
the Work of Henry Ford.

Sub-Committee: Mr. Benjamin Franklin, Chairman

Mr. Edward L. Clark

Mr. Charles D. Galloway

Mr. Coleman Sellers, 3rd

Mr. Robert L. Wood

To the Committee on Science and the Arts:

Your Sub-Committee, appointed to investigate the above case, re-
ports as follows:

Henry Ford, the son of William and Mary Litogot Ford, was born on
July 30, 1863, at Greenfield, near Detroit, Michigan. His early life was spent
on his father's farm and his education was received at the district school in
Greenfield. Living the life of a farmer's boy he became acquainted, in a
practical way, with the work to be done on a farm, and later used this knowledge

1 to good advantage in devising machines that have proved of great value in farming
2 operations.

3 The long and toilsome days of the busy season on the farm did not
4 appeal favorably to young Ford, and since he was interested in all kinds of
5 machinery, he became an apprentice in an engine works where he learned the
6 machinist's trade. Becoming an expert machinist he made rapid progress, and
7 was advanced from one position to another until he became the chief engineer
8 of the Detroit Edison Company.

9 Mr. Ford made many inventions, and took out many letters patent,
10 in foreign countries as well as in the United States. The first in the United
11 States, No. 686,046, was issued on November 5, 1901, for a Motor Carriage, and
12 was assigned to the Detroit Automobile Company, Plate I. Many patents followed
13 in later years, covering many parts of an automobile, and accessories, such as
14 mufflers, chain adjustments, drive gears, steering mechanisms and speed con-
15 trollers. Perhaps of all Mr. Ford's inventions, that of the planetary drive gear
16 (U.S. Patent No. 787,908, of April 25, 1905) was most significant; for that gear
17 was used on the famous Ford car known as the Model T. These patents of course
18 covered the four cylinder car, known as Model N, of which there were sold in two
19 years a number of cars in excess of the total number of automobiles which all the
20 motor car makers of the world together had been able to produce previously.

21 The first car was completed in 1892 when Mr. Ford was twenty-nine,
22 but the increase in production was slow for the first few years, it being ten
23 years before the first thousand machines were built. The Ford Motor Company was
24 formed, though, with a small amount of paid in capital, about \$28,000., and its
25 progress was necessarily slow. During the early years of automobile production,

development was delayed in many cases on account of the Selden patents which were so broad that they covered almost any kind of motor applied to a four wheeled vehicle. Manufacturers were compelled to pay royalties on this patent for some years until after a long series of legal trials the matter was finally settled by a decision in the United States Court of Appeals, in the case of Selden vs. Ford, et als, which declared that the statement - "that Selden has solved a great problem and is entitled to the status of a pioneer inventor, is, we think, without foundation".

In all of this litigation Mr. Ford was a leading figure.

In the meantime automobiles were being built abroad by Daimler and Bentz, and in this country by Duryea, Ford, Olds and others and the defeat of the claims of the Selden patent gave such an impetus to automobile construction that the number in use rapidly increased.

The manufacture of machine Model "N" was discontinued and the Ford Machine, Model "T", was standardized in 1908, both as to type of machine and method of manufacture, - Plate II. The output of the Ford automobile manufacturer is shown diagrammatically in Plate III from which it can be seen that the number increased from about 10,000 in 1908 to 2,000,000 in 1923 with a falling off during the years of the World War.

Plate III also shows a diagram of the cost of the Model "T" touring car for these years.

The reduction in cost of the Ford car to less than one third of the original cost is due to a combination of the following causes: The making of a standard car with parts that are interchangeable; standardization of the manufacture of it; the introduction of moving conveyers by which the work is brought

1 to the workman, each man doing one operation at which he becomes expert, and a
2 determination on the part of Mr. Ford to furnish these cars at prices low enough
3 to permit of their widespread use.

4 Since maximum production in manufacturing requires that the work
5 shall go on uninterruptedly, Mr. Ford decided that measures must be taken to pre-
6 vent strikes; accordingly, in 1914 he announced that the minimum wage to any
7 workmen should be five dollars per day, irrespective of the kind of work done.
8 The plan is said to have proved satisfactory in its results, and at present the
9 minimum daily wage is reported as six dollars for an eight hour day. The Ford
10 Company claims that over 60% of the employees receive more than the minimum.
11 No record has been kept of the labor turnover during the past two years, but
12 previous to that it did not average more than 2% per month.

13 The conveyer system employed in the Ford plants has been an im-
14 portant factor in securing a high rate of production. In this system a con-
15 tinuously moving platform is loaded at the proper intervals with the parts to
16 be used by the workman who stands in one place and makes use of the part as it
17 is brought to him. A careful test is made of the time of each operation and
18 the rate of the moving conveyer regulated accordingly.

19 The practical result of the introduction of this system has been
20 to increase greatly the speed of manufacture and to facilitate mass production.
21 The last operation in the succession is the assembling of the automobile, which
22 is done on a long moving platform or track, on which the different parts are
23 added in order. When the end of the track is reached, the car can be driven off
24 under its own power.

25 The conveyer system applied to the assembling of cars, introduced

1 by the Ford Motor Company, and which has been revolutionary in its effect, is
2 now in general use by the automobile and other industries where mass production
3 is required.

4 On May 26, 1927, the 15,000,000th Ford automobile left the plat-
5 form driven by Edsel Ford, President of the Company, with his father as passenger.
6 Going to the Museum of the Company, Ford Machine No. 1 was brought out and
7 driven by Henry Ford.

8 The tremendous increase in the output of the Ford Motor Company
9 is seen in the fact that it operates thirty-five branches in the United States
10 of which thirty-two are assembly plants.

11 The increased manufacture called for a great amount of raw
12 material and for its preliminary manufacture into the various parts used in
13 an automobile. Believing that these parts could be manufactured for a lower
14 price by his own plants than that paid for them in the markets, Henry Ford
15 undertook the purchase of raw material and its manufacture as required. This
16 included the acquisition of iron and coal mines and timber lands, and the
17 building of a railroad and line of steamboats. Raw materials are conveyed
18 to the River Rouge plant, which is provided with coke ovens, blast furnaces and
19 saw mills. This plant is equipped with electric furnaces, a cement plant, a
20 glass factory, paper mill, foundry and machine shops. All these being under
21 the control of a single organization, are highly efficient in producing an
22 economical manufacture of the Ford automobile.

23 That this has been effective is indicated in the curve of Plate
24 III showing the decreasing cost of Model "T" with increasing production, and
25 also by the fact that up to, and including, 1924, the output of Ford cars was

1 equal to that of all other automobile manufacturers combined.

2 In order to carry out his idea of making machines suitable for
3 farm work, Mr. Ford took up the production of small tractors at the River Rouge
4 plant where the factory for building them has a capacity of 750 "Fordsons", as
5 these tractors are called, each day. These tractors are adapted to many kinds
6 of work and have largely replaced horses. These are covered by U. S. Patents,
7 No. 1,036,480 and No. 1,153,052, and others.

8 The extended use of the Ford automobile has resulted from the
9 ability of the company to produce a reliable small car at a low cost. This
10 has been accomplished through Mr. Ford's originality in manufacturing methods,
11 and his genius in building up a large organization, with the economies in buy-
12 ing, manufacture and distribution possible only in large scale operations.

13 In addition to being the most conspicuous figure in the auto-
14 mobile world, Mr. Ford is owner and operator of a railroad and ship line, coal
15 and iron mines, a leader in blast furnace methods, the second largest glass
16 manufacturer in this country and a pioneer in commercial aviation.

17 He is a grower of flax, maker of linen cloth, and weaver of wool,
18 builder of hydro-electric plants, locomotives, and the successful manager of a
19 10,000 acre farm. Through his organization he operates in thirty-five widely
20 varied industrial fields. To the above list may be added many social and philan-
21 thropic activities; among them the Henry Ford Hospital in Detroit. Although many
22 of these activities were secondary, and were undertaken in support of his original
23 and foremost purpose, a good, inexpensive automobile, yet the combination of them
24 all distinguishes him as a leading originator and executive genius of the world,
25 exercising a marked influence in mechanical and administrative engineering in many
lines of manufacture.

It is an extremely difficult matter to value adequately the work of Henry Ford in the uplifting of the human race. As a farmer's boy, he had an intimate knowledge of the drudgery, isolation and monotony of farm life; his inventions have contributed very largely toward eradicating them.

His inexpensive Ford car and truck have completely changed conditions on the farm, enabling a farmer to command better and diversified markets, and to enlarge the social and intellectual contacts of himself and family. The Fordson tractor has increased his efficiency as an agriculturist, and particularly in the Northern States, by dispensing with horses, has enabled him to devote a greater area to crops not consumed on the farm.

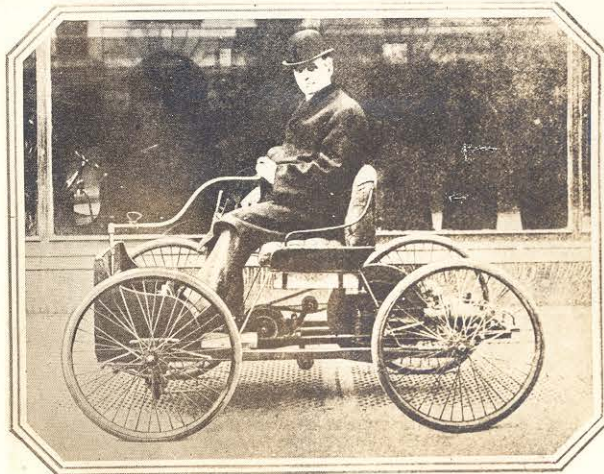
To the workman, speedy transportation has opened up a larger field of operation. To the average citizen, the inexpensive car has developed many sources of pleasure heretofore enjoyed only by the wealthy few; and by making possible a more extensive and diversified travel, has created a better knowledge of our country and developed a broader vision.

In consideration of his rare inventive ability and power of organization, by means of which he was able to effect high speed production of automobiles, revolutionizing the industry; and his outstanding executive powers and industrial leadership, your Sub-Committee recommends the Elliott Cresson Medal to Mr. Henry Ford, of Detroit, Michigan.

Respectfully submitted,

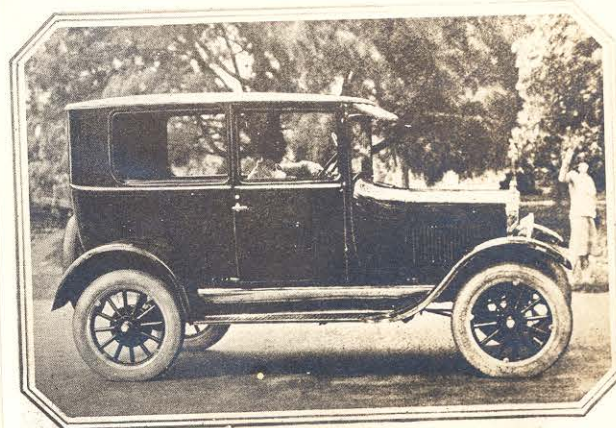
Ray Franklin Chairman
F. D. Salloway
Coleman Sellers
Edward L. Clark
Robert L. Wood

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THE FIRST FORD
S. & A. Case No. 2878
Work of Henry Ford, Plate I.

PLATE I.



THE MODEL "T"
S. & A. Case No. 2878
Work of Henry Ford, Plate II.

PLATE II.

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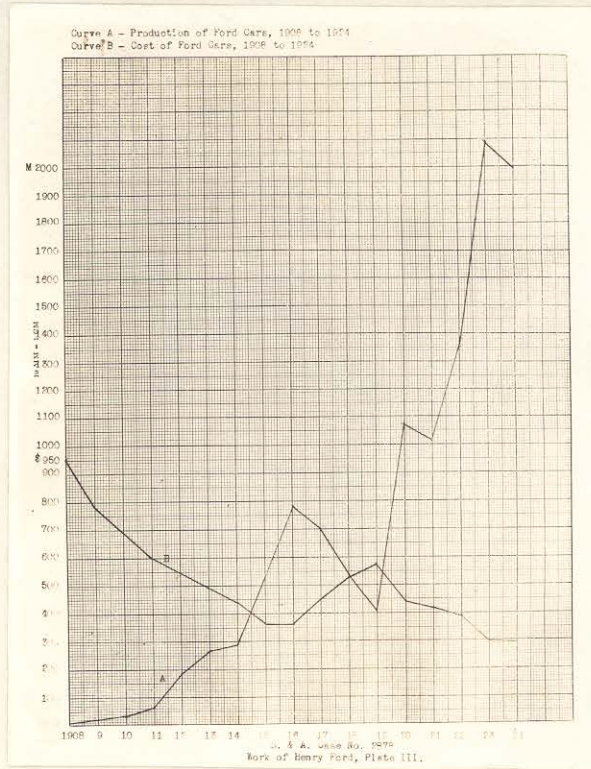


PLATE III.

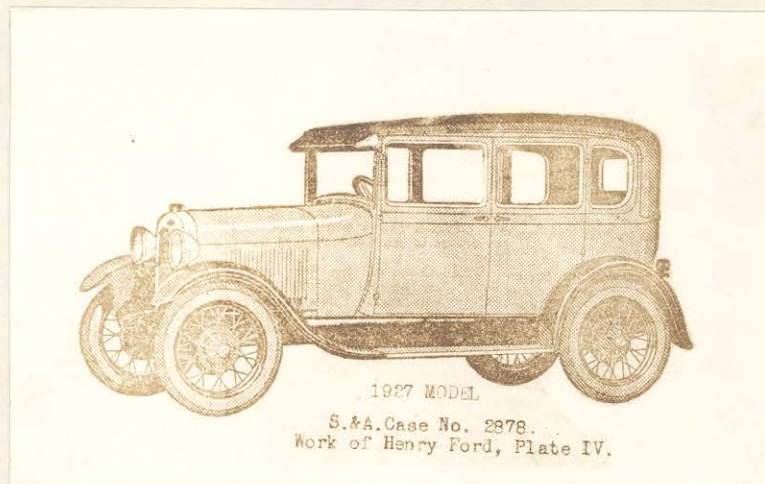


PLATE IV.